The Claims:

1. A method of storing data in an optical data storage device, the method comprising the steps of:

encoding information and determining a multi-channel grating structure for the encoded information and

applying the grating structure to an optical waveguide in a manner such that in use the multi-channel grating will effect a change of a property of optical radiation that passes through the waveguide, the change of the property being characteristic for the encoded information.

2. The method as claimed in claim 1 comprising the step of detecting the change of the property to retrieve the information.

3. The method as claimed in claim 1 or 2 wherein the multi-channel grating has a grating structure that may be created by superposition of a plurality of second grating structures.

4. The method as claimed in any one of the preceding claims wherein the grating functions as a read only memory (ROM).

5. The method as claimed in any one of the preceding claims wherein the multi-channel grating is a Bragg grating that has a periodic refractive index profile which has an envelope that is characteristic for the encoded information.

6. The method as claimed in any one of the preceding claims wherein the step of encoding the information comprises usage of encoding schemes.

7. An optical storage device in which data is stored using the method as claimed in any one of claims 1 to 6.

8. An optical read-only memory (ROM) comprising a waveguide having a multi-channel grating having a grating structure which is associated with encoded information and that in use effects a change of a property of optical radiation that passes through the multi-channel grating, the change of the property being characteristic for the encoded information.

9. The optical read-only memory as claimed in claim 8 wherein the multi-channel grating has a refractive index profile that is of the type being creatable by a superposition of a plurality of second refractive index profiles having different spatial frequencies.

10. The optical read-only memory as claimed in claim 9 wherein each second refractive index profile is associated with a single channel of the multi-channel grating.

11. The optical read-only memory as claimed in claim 9 wherein the refractive index profile of the multi-channel grating is of the type that produces a noise-like amplitude response.

12. The optical read-only memory as claimed in any one of claims 9 to 11 wherein the multi-channel grating is a

Bragg grating that has a number of possible phase and amplitude levels for each channel.

13. The optical read-only memory as claimed in any one of claims 9 to 12 wherein each channel of the multi-channel grating has a number of wavelength divisions.

14. The optical read-only memory as claimed in any one of claims 9 to 13 wherein each channel of the multi-channel grating has a number of possible different phase and amplitude levels.

15. The optical read-only memory as claimed in any one of claims 9 to 13 wherein the grating has a refractive index variation that has a profiled envelope along the length of the grating.

16. A method of reading information from an optical data storage device, the data storage device comprising a multi-channel grating which has a refractive index variation that is associated with encoded information, the method comprising the steps of:

directing optical radiation to the multi-channel grating so that the multi-channel grating will effect a change of a property of the optical radiation,

receiving the optical radiation having experienced the change of the property and thereafter

processing the optical radiation to obtain the information.

17. The method as claimed in claim 16 wherein the multi-channel grating may function as a read only memory (ROM).

18. The method as claimed in claim 16 or 17 wherein the information is useable to identify an optical waveguide in which the multi-channel grating is positioned.

19. The method as claimed in any one of claim 16 to 18 comprising the step of directing a Laser pulse to the multi-channel grating.

20. The method as claimed in any one of claim 16 to 19 wherein at least a portion of the optical radiation is reflected by the multi-channel grating and the step of processing the optical radiation comprises analysing the reflected optical radiation to identify a response of the multi-channel grating.

21. The method as claimed in any one of claim 16 to 19 wherein at least a portion of the optical radiation is transmitted by the multi-channel grating and the step of processing the optical radiation comprises analysing the transmitted optical radiation to identify a response of the multi-channel grating.

22. The method as claimed in any one of claim 16 to 21 wherein the step of directing optical radiation to the multi-channel grating comprises directing light from a tunable laser to the multi-channel grating.

23. The method as claimed in claim 22 further comprising the step of scanning the wavelength of the laser through a wavelength range that corresponds to the channels of the multi-channel grating.

24. The method as claimed in any one of claim 16 to 22 wherein the step of directing optical radiation to the multi-channel grating comprises directing a laser pulse to the multi-channel grating and phase and amplitude changes of the laser pulse are detected to retrieve the information.

25. The method as claimed in any one of claims 19 to 24 wherein the encoded information comprises directions for the installation of the optical waveguide.

26. The method as claimed in claim 25 comprising the additional step of installing the waveguide according to the directions.

27. A method of testing an optical network, the optical network comprising optical waveguides, each optical waveguide having a multi-channel grating which has a refractive index variation that is associated with encoded information, the method comprising the steps of:

directing optical radiation to the multi-channel gratings so that the multi-channel gratings will effect a change of a property of the optical radiation,

receiving the optical radiation having experienced the change of the property and thereafter

processing the optical radiation to obtain the information.

28. A method of installing an optical network, the optical network comprising optical waveguides, the method comprising the steps of:

directing optical radiation to the multi-channel gratings so that the multi-channel gratings will effect a change of a property of the optical radiation, each multi-channel grating having a refractive index variation that is associated with encoded information,

receiving the optical radiation having experienced the change of the property, thereafter

processing the optical radiation to obtain the information and

installing the optical network utilising the information.